Designing Adaptable Technologies for Talk-Based Mental Health Interventions

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Abstract
This paper provides an overview of an adaptable model for the design of technologies for talk-based mental health interventions. The PlayWrite system, also briefly described, is an implementation of this design appoach.

Keywords
Mental health, design methodologies, adaptable design, user centred design, computer gaming

ACM Classification Keywords
H.5.m [Information Interfaces and Presentation]: Miscellaneous – Evaluation/methodology, User-centred design, Mental health.

Introduction
In discussing both the generic and specific nature of design in a particular domain [7] states: *"a lot of domain specific knowledge is needed, and the practices of design are different in different domains. … Useful design tools need to be domain-specific, but many of the principles behind the tools are generic."* Designing technologies for talk-based mental health interventions (MHIs) is a relatively new area of HCI research. As such, whilst successful design will benefit from the application of established HCI techniques, it also requires the identification of the challenges and design

requirements specific to the mental health care (MHC) domain.

Recent research has identify several significant challenges to designing effectively for MHC settings [4]. Of the challanges identified, ethical requirements along with the sensitivity and stigma associated with mental illness pose particular challenges for design and evaluation. These factors place severe limitations on access to MHC settings by non-MHC professionals, and create difficulties in the direct application of traditional HCI approaches, such as user-centred, participatory and iterative design. Overcoming these difficulties requires the collaboration of HCI and MHC professionals. The potentially significant benefits of adaptability in systems designed for this area has also been identified [4]. For technologies to be of practical use in a broad range of MHC settings, [4] suggests that systems should ideally be adaptable to (1) a broad range of theoretical models, (2) a broad range of mental health disorders, (3) the differing needs of various demographic groups, and (4) the specific needs of individual clients.

Adaptable Design

Fig.1 outlines a two stage model for adaptable design in the MHC domain. The primary aims of this model are twofold. Firstly, it aims to support effective collaboration between HCI and MHC professionals. Secondly, it aims to provide a sustainable approach to the development of user-centred technologies, which can be adapted to meet the needs of a broad variety of therapists and clients.

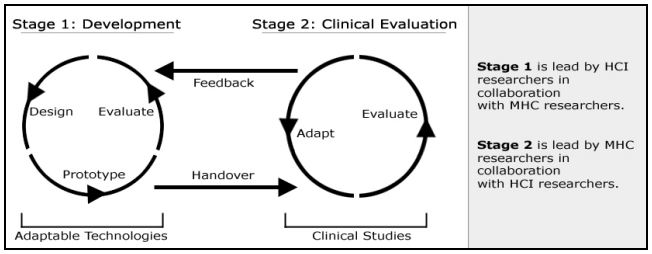

figure 1. adaptable design for talk-based mental health care.

Stage one of the adaptable design model focuses on the design and development of technologies. The aim at stage one is to develop and evaluate systems to the point where they are shown to be usable by the target end users, are agreed to have clinical validity and are predicted to have therapeutic benefits. Rather than developing fixed solutions at the development stage, it is proposed that flexible systems are developed. Further to this it is proposed that the ability to make adaptations to systems be placed in the hands of MHC professionals. Stage two focuses on clinical evaluations. MHC professionals have the opportunity to adapt systems to suit their own needs and those of their clients and to then evaluate systems in clinical settings.

Effective communication channels between stages one and two are an essential element of the model. It is envisioned that stages one and two will overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC professionals. As systems are developed at stage one they can be taken to stage two for clinical evaluation. The results of this evaluation will feed back into further design and development at stage one, which in turn provides further possibilities for clinical evaluation at stage two.

In this way a parallel process for collaborative design and evaluation can evolve.

For a more detailed description of the adaptable design model see [3].

Forms of Adaptation
For the purpose of the discussion presented here, the forms of adaptation possible in any system are divided into two broad categories: functional and content, fig.2. Content adaptations focus on what content is delivered by a system. Functional adaptations focus on how the content is delivered. Whilst functional adaptations to a system will generally require HCI and technical skills (e.g. knowledge of design methodologies or the ability to use a programming language), content adaptations are more reliant on therapeutic skills relevant to the domain. The choice of appropriate forms of adaptation to make available to MHC professionals is an important decision in the design of any system. To date research on the adaptable design model has focused on developing systems which allow MHC professionals to make content oriented adaptations. Again for further details see [3].

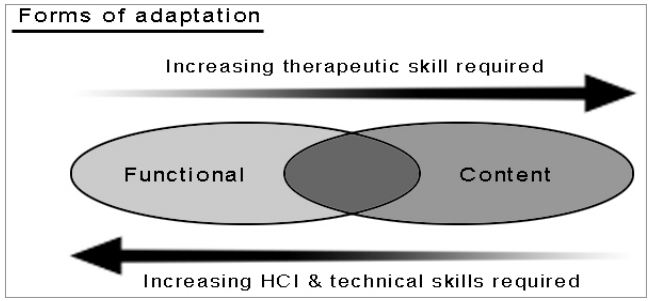

figure 2. forms of adaptation

The Structure of an Adaptable System
Content adaptation systems, such as the PlayWrite system described below, can consist of two key components:

1. Applications which allows MHC professionals to create and adapt the content delivered by a system.

2. Applications which deliver this content in MHIs.

DESIGNING CONTENT CREATION AND ADAPTATION APPLICATIONS

Content creation and adaptation applications should be designed to meet the needs of MHC professionals, e.g. they should take advantage of their existing skills. One of the strengths of the adaptable design model is that many traditional approaches to user-centred design can be applied in the design and evaluation of such applications. Contact with MHC professionals is not encumbered by the access constraints which apply to contact with clients. For example, therapists can be interviewed as part of a requirements gathering phase, various prototyping techniques can be used, and as applications are developed traditional usability evaluations can be conducted.

DESIGNING CONTENT DELIVERY APPLICATIONS

Content delivery applications should focus on delivering content in client-centred ways and in ways which are appropriate to the aims of MHIs. For example, the PlayWrite system was designed for adolescent MHIs, and delivers content in 3D games. Design approaches applied in the development of content delivery systems must take account of the access restraints of the domain. Applications can be designed in collaboration with MHC professionals and can apply guidelines such as those described in [4]. Approaches such as the

multi-stage prototyping technique proposed by [6] can also help to improve the usability of applications prior to clinical evaluations and increase the probability that systems will achieve the desired therapeutic benefits.

PlayWrite

The PlayWrite system is an implementation of the adaptable design model. The system builds on initial research demonstrating the potential of computer games in adolescent interventions [5]. Rather than delivering a fixed game, PlayWrite enables MHC professionals to create and adapt therapeutic 3D computer games, which can then be used in adolescent MHIs. As suggested above, PlayWrite consists of both content creation and content delivery applications. The system provides MHC professionals with a 3D game template and a set of content creation application, with which the content for games can be created or adapted, fig.3. Further details of PlayWrite are available in [3].

figure 3. an overview of the PlayWrite system

In total 55 MHC professionals from 18 different services throughout Ireland and the UK have participated in the evaluation of PlayWrite. The results of this study indicate that the adaptable design model can support effective collaboration, and can provide a sustainable approach to the development of technologies which can be adapted to meet the needs of a broad range of end users. In all 10 new games have been created using PlayWrite. These games implement a wide range of theoretical approaches to talk-based MHC and address a broad variety of specific disorders. Several games are also targeted at specific social groups. Personal Investigator, the first game created with PlayWrite, has undergone a multi-site clinical evaluation, in which 9 MHC professionals have used the game with 22 adolescent clients. This evaluation indicates that games created with PlayWrite can have a positive impact on adolescent MHIs. Benefits can include increased client engagement and improvements in client-therapist relationships.

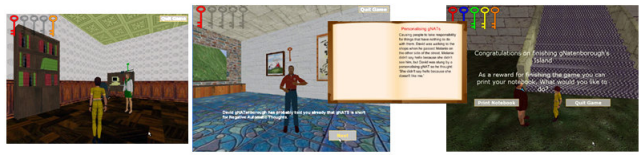

figure 4: screenshots from a PlayWrite game

Alongside developing new games, the process of creating these games has provided a large amount of feedback which can be acted upon in future iterations of the system. As well as a large body of direct feedback from MHC professionals, new possibilities not envisioned by the designers of PlayWrite have emerged though MHC professionals use of the system. The PlayWrite system has now reached a point at which

clinical evaluations and systems development are proceeding in parallel and complement one another. Whilst the design team continues to develop the system, several detailed and complementary evaluations of PlayWrite have now been initiated by independent mental health research centres.

Future Work

The adaptable design model can assist in the design of technologies for talk-based MHIs. However research to date has, by necessity, focused on broad, high-level aspects of designing for the MHC domain. Further work is now required to provide a more detailed understanding of the techniques best suited to different stages of an overall design process. For example, what techniques at most effective at a requirements gathering stage. Approaches such as scenario based storytelling and role-playing have proven effective in related domains, in which access to end users is restricted, e.g. [2, 8]. Investigating techniques which increase the effectiveness of non-clinical evaluations is another worthwhile research objective. For example heuristic evaluations have been shown to be effective in other HCI domains. Is there an appropriate and effective heuristic checklist for technologies in the MHC domain?

One limitation of the adaptable design model is the absence of input from clients into the overall design process. Whilst limitations on access to clients are an inherent aspect of design in the MHC domain, future work should seek to find new ways of overcoming this challenge. The adaptable design model seeks to address this challenge by increasing the potential for collaboration with MHC professionals and by allowing MHC professionals to adapt systems to suit the needs of clients. One possible method for increasing client participation involves the development of systems which can be adapted not just by MHC professionals, but also by clients. Large bodies of research in educational areas have explored the benefits of systems which allow teachers/educators and learners to experiment together and co-construct personally meaningful artefacts, e.g. [1]. It will be interesting to see if the adaptable design model can be combined with such approaches, to create systems which can be adapted by therapists and clients, in order to co-create therapeutically meaningful artefacts. This co-creation process could serve two proposes. It could be an effective therapeutic task in its own right and could also create artefacts and content that could then be used with other adolescent clients. MHC professionals who participated in the evaluation of PlayWrite have indicated an interest in such systems.

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